

**ARRANGEMENT INTRODUCED IN A HIDDEN RECEIVER-SENDER
DELIMITER FOR PNEUMATICS AND SIMILARS**

BRIEF PRESENTATION

The present application for a Utility Model Patent refers to a novel
5 device projected to allow the use of a transponder (sender and receiver device
for radio frequency signals) in aggressive means, be them of mechanical,
chemical or other origin, not causing losses which could cause damage to said
transponder.

STATE OF THE ART

10 As it is widely known, a transponder comprises a coil reel and a
chip interconnected to said reel.

In the current state of the art, said components (reel and chip) do
not receive any protection for use in different applications.

However, the use of transponders in different fields has found
15 different means of application, with building solutions adapting to keep their
functionality, such as the capacity to store data such as identification, location
and others, with the purpose to promote a better control of the receiver products
of said transponders.

Such situations or applications often include chemical or
20 mechanical means, among others, in which the aggression to the transponder
would be naturally forecasted, so to make its use for this application become
unfeasible or, when allowed, generate very reduced working life which would
end up by compromising the project.

In the so-called chemical means, the transponder becomes fully

2/7

unprovided of any protection (for both chip and reels), i. e. not provided with efficient covering, thus causing its deterioration from chemical reactions in contact with said chemical means.

In the case of mechanical means, we mention as an example the
5 use of a transponder inside tires, since the material used to manufacture tires is usually transparent to electromagnetic waves. However, the fact to be highlighted is that, inside the tires, temperature may reach about 100 °C, and there is also very strong twisting, notably due to the large tonnage (especially in the case of cargo transportation vehicles - the most desired ones - and
10 passenger transportation vehicles); besides said twisting, very intense vibration is established.

With this purpose, the current state of the art has attempted, specifically in the case of protection in mechanical means, to manufacture a kind of "shell", which serves as a "capsule" for the transponder. This "shell" is
15 usually made of an epoxy resin material or similar. With temperature and vibration, the epoxy resin - which is very hard and consequently rigid - starts breaking easily the antenna wires, causing obvious problems related to the efficiency of the transponder.

OBJECTS OF THE PATENT

20 In this Utility Model, a covered and encapsulated transponder is disclosed, or a capsule to house said transponder, so to obtain a transponder which use is extremely efficient, resistant and durable for chemical, mechanical or other means requiring full sealing and resistance against mechanical efforts of twisting, traction, compression and others. In other words, the transponder is

then double protected.

This application contemplates the covering of the transponder from the use of transparent film to electromagnetic waves, i. e. both of the wire forming the reels but also the chip which is a part of the transponder, so to make it become fully able to be employed in chemical means, since it becomes resistant against the attack of chemicals, acids and others, being this one the first protection. Subsequently, this set, after being duly covered, is encapsulated in a cover formed by a male and a female portion which fit themselves to provide perfect chemical sealing, completing the protection for use in such conditions. This capsule is made of transparent material to electromagnetic waves, such as a product of the group of plastics with relative flexibility, and makes the set become also resistant against mechanical efforts, such as twisting, flexion, traction and others; this capsule constitutes the second protection.

In the mechanical use as an example herein, such as inside tires, there is characteristic large twisting caused by the temperature, weight and turning of tires, besides the naturally present vibration; for that purpose, this capsule creates an internal chamber in which the already covered transponder is housed so not to suffer damage which may compromise the operation of the transponder.

In other words, transponder covering by means of a plastic film determines the chemical isolation of the transponder and also offers mechanical isolation against vibration, promoting a certain damping. This is the first protection.

The already covered set as described above is introduced under pressure into a capsule of a polycarbonate material or similar, which has the purpose to absorb mechanical efforts, such as twisting and impact. For that purpose, said capsule has within it a housing in which the previously covered

5 transponder fits under pressure, forming smooth arching determining a "spring" effect having the purpose to avoid the transponder to absorb vibration, as well as the random balance inside said capsule. Furthermore, the housing for the transponder within said capsule is such that, in case said capsule suffers very large twisting or impact which ends up by deforming it, the transponder is not

10 damaged or deformed. This capsule is the second protection.

Therefore, from this process and the respective capsule, we can reach an efficient means to house the transponder, which is highly efficient under the conditions of use in various chemical and mechanical means.

DESCRIPTION OF THE FIGURES

15 The present invention will be described below with reference to the attached drawings, which show:

Figure 1: exploded perspective view of the capsule and respective transponder, as already covered;

Figure 2: perspective view of the capsule in the closed position, with the internal components (not shown), as will be used in the chemical or

20 mechanical means;

Figure 3: cut view of the capsule with the transponder inside it.

DETAILED DESCRIPTION OF THE PATENT

The ARRANGEMENT INTRODUCED IN A HIDDEN RECEIVER-

SENDER DELIMITER FOR PNEUMATICS AND SIMILARS object of this application for a Utility Model Patent consists of a conventional transponder (T) for emission and reception of radio frequency (RF) signals composed by a chip (1) and a coil reel (2), forming a device which, by means of especially
5 developed protection, has the main purpose to provide conditions for the use of this transponder (T), with no prejudice to its features, in aggressive chemical or mechanical means, in this case if there are associated heat, mechanical efforts and vibration factors. With that purpose, the construction previews double protection, i. e.: in the first one, the covering of the transponder (T) by means of
10 the plastic film (F) (isolating the set from chemical aggression and vibration); in the second one, said previously covered set is introduced inside a capsule (3), working to avoid the transponder (T) to be reached by twisting, impact and other mechanical efforts.

The capsule (3) integrating said constructive arrangement is made
15 of transparent material to electromagnetic waves, appropriate to resist against various mechanical efforts, i. e. twisting, flexion, traction or even mechanical vibrations. The used material is preferably a polycarbonate provided not only with transparence to electromagnetic waves, but also relative pliability.

Thus, the transponder (T) construction is fully protected, i. e.
20 including the chip (1) and the coil reel (2), from the use of a plastic film (F) which is resistant against naturally aggressive chemicals in general, being also transparent to electromagnetic waves, being this procedure preferably taken following a skill which may be covering, immersion or any other allowing said resource and having quick drying conditions.

Once covered, the transponder (T) may reply with full efficiency to the use in naturally aggressive chemical means, including acids, also isolating the vibration existent in conditions of use.

The transponder (T) is subsequently encapsulated, being
5 introduced inside a capsule (3) of transparent material to electromagnetic waves and appropriate to resist against different mechanical efforts, some of which were already mentioned above, occurring e. g. inside a tire, which is used as an example in the present invention.

For that purpose, the transponder (T) is introduced between the
10 male (4) and female (5) portions of said capsule (3), which are compatible with the dimension and configuration characteristics of the transponder (T).

The female portion (5) of the capsule (3) is provided with a compact base (6) giving origin to the equally compact side (7) forming a smooth end rim (8), so that the internal wall of that side configures a small straight path
15 (9), distal from the compact base (6), followed by a "V" shape deepening (10) and the latter by a retracted bottom housing (11) which has its width limited by a ring wall (12), which height extends up to about the vertex of the mentioned "V" deepening (10), with said ring wall (12) having a bevel (13) on the side of the male portion (4) and rounding (14) on the side of the transponder (T). The
20 bottom (15) of this compact base (6) is located at a level above the retracted bottom (11).

On the other hand, the male portion (4) discloses a compact top (16), which diameter is substantially compatible with the straight path (9) of the female portion (5), with said top (16) incorporating a corresponding straight path

(17) followed by a projection substantially in "V" (18) which is coupled and fits under relative pressure to the deepening in "V" (10), while an equally ring-shaped rim (19) is settled over the retracted bottom (11), so to be restrained by the ring wall (12). Therefore, the male (4) and female (5) portions are fitted
5 within themselves under considerable pressure which increases under conditions of use, being their accidental or even deliberate separation very difficult.

Between the bottom (15) of the compact base (6) and the maximum height of the ring wall (12), coinciding with the bottom (20) of the
10 compact top (16), a chamber (21) is created, inside which the transponder (T), already with the first projection, is housed, with a diameter adjustment existing in said chamber very near to the internal diameter of the ring wall (12), with said chamber (21) also having dimensions to fit the transponder (T), already with the first protection, under adequate pressure, creating a "spring effect" which can
15 be observed in the smooth arching of Figure 3, thus forbidding that it balances randomly inside the chamber (21), eliminating any vibration. As we can observe still in Figure 3, said chamber (21) configured in the capsule (3) of the second protection has such dimensions to allow that, after a huge twisting or impact over the capsule (3), the transponder (T) does not happen to deform, thus
20 guaranteeing to keep its features very efficiently.

CLAIMS

1. ARRANGEMENT INTRODUCED IN A HIDDEN RECEIVER-SENDER DELIMITER FOR PNEUMATICS AND SIMILARS, notably of a conventional transponder (T) for the emission and reception of radio frequency (RF) signals
5 composed by a chip (1) and a coil reel (2), characterized by covering, in its full construction, i. e. including chip (1) and the coil reel (2) from the use of a plastic film (F), said transponder (T) thus covered, being introduced between the male (4) and female (5) portions of a capsule (3) provided with a compact base (6) giving origin to the equally compact side (7) forming a smooth end rim (8), so
10 that the internal wall of that side configures a small straight path (9), distal from the compact base (6), followed by a "V" shape deepening (10) and the latter by a retracted bottom housing (11) which has its width limited by a ring wall (12), which height extends up to about the vertex of the mentioned "V" deepening (10), with said ring wall (12) having a bevel (13) on the side of the male portion
15 (4) and rounding (14) on the side of the transponder (T); the bottom (15) of that compact base (6) is located at a level above the retracted bottom (11); the male portion (4) discloses a compact top (16), which diameter is substantially compatible with the straight path (9) of the female portion (5), with said top (16) incorporating a corresponding straight path (17) followed by a projection
20 substantially in "V" (18) which is coupled and fits under relative pressure to the deepening in "V" (10), while an equally ring-shaped rim (19) is settled over the retracted bottom (11), so to be restrained by the ring wall (12); the male (4) and female (5) portions become fitted between them under considerable pressure; between the bottom (15) of the compact base (6) and the maximum height of

the ring wall (12), coinciding with the bottom (20) of the compact top (16), a chamber (21) is created, inside which the transponder (T) is housed, with a diameter adjustment existing in said chamber very near to the internal diameter of the ring wall (12).

5 **2. ARRANGEMENT INTRODUCED IN A HIDDEN RECEIVER-SENDER DELIMITER FOR PNEUMATICS AND SIMILARS** of claim 1, in which the chamber (21) has dimensions to allow the previously covered transponder to fit under pressure, forming smooth arching determining a "spring" effect having the purpose to avoid the transponder to absorb vibration, as well as the random
10 balance inside said capsule and, in case of huge twisting or impact over the capsule (3), the transponder (T) does not happen to deform.

3. ARRANGEMENT INTRODUCED IN A HIDDEN RECEIVER-SENDER DELIMITER FOR PNEUMATICS AND SIMILARS of claims 1 and 2, which is employed in aggressive chemical or mechanical means, with no prejudice to the
15 functions of the transponder (T), since it presents double protection; the first one from the cover by the plastic film or similar (F), immersion or any other form allowing said resource and being able to quickly dry chemical and mechanical insulation; and the second one through the capsule (3) made of transparent material to electromagnetic waves and appropriate to resist against various
20 mechanical efforts, be them twisting, flexion, traction or even mechanical vibrations, being the employed material preferably a polycarbonate provided not only with transarence to electromagnetic waves, but also relative flexibility.

4. ARRANGEMENT INTRODUCED IN A HIDDEN RECEIVER-SENDER DELIMITER FOR PNEUMATICS AND SIMILARS of claims 1 and 3, in which

the first protection, i. e. covering, allows the transponder (T) to respond, in a fully efficient way, to the use in naturally aggressive chemical means, including acids.

5. ARRANGEMENT INTRODUCED IN A HIDDEN RECEIVER-SENDER

5 **DELIMITER FOR PNEUMATICS AND SIMILARS** of claims 1 and 2, in which the second protection, i. e. encapsulation, consists of the introduction of the transponder inside a capsule (3) in transparent material to electromagnetic waves and appropriate to resist against various mechanical efforts, such as those occurring inside a tire.

10 **6. ARRANGEMENT INTRODUCED IN A HIDDEN RECEIVER-SENDER**

DELIMITER FOR PNEUMATICS AND SIMILARS of claims 1, 2 and 5, in which the chamber (21) has dimensions to allow the previously covered transponder to fit under pressure, forming smooth arching determining a "spring" effect having the purpose to avoid the transponder to absorb vibration, as well as the
15 random balance inside said capsule and, in case of huge twisting or impact over the capsule (3), the transponder (T) does not happen to deform.

FIG. 1

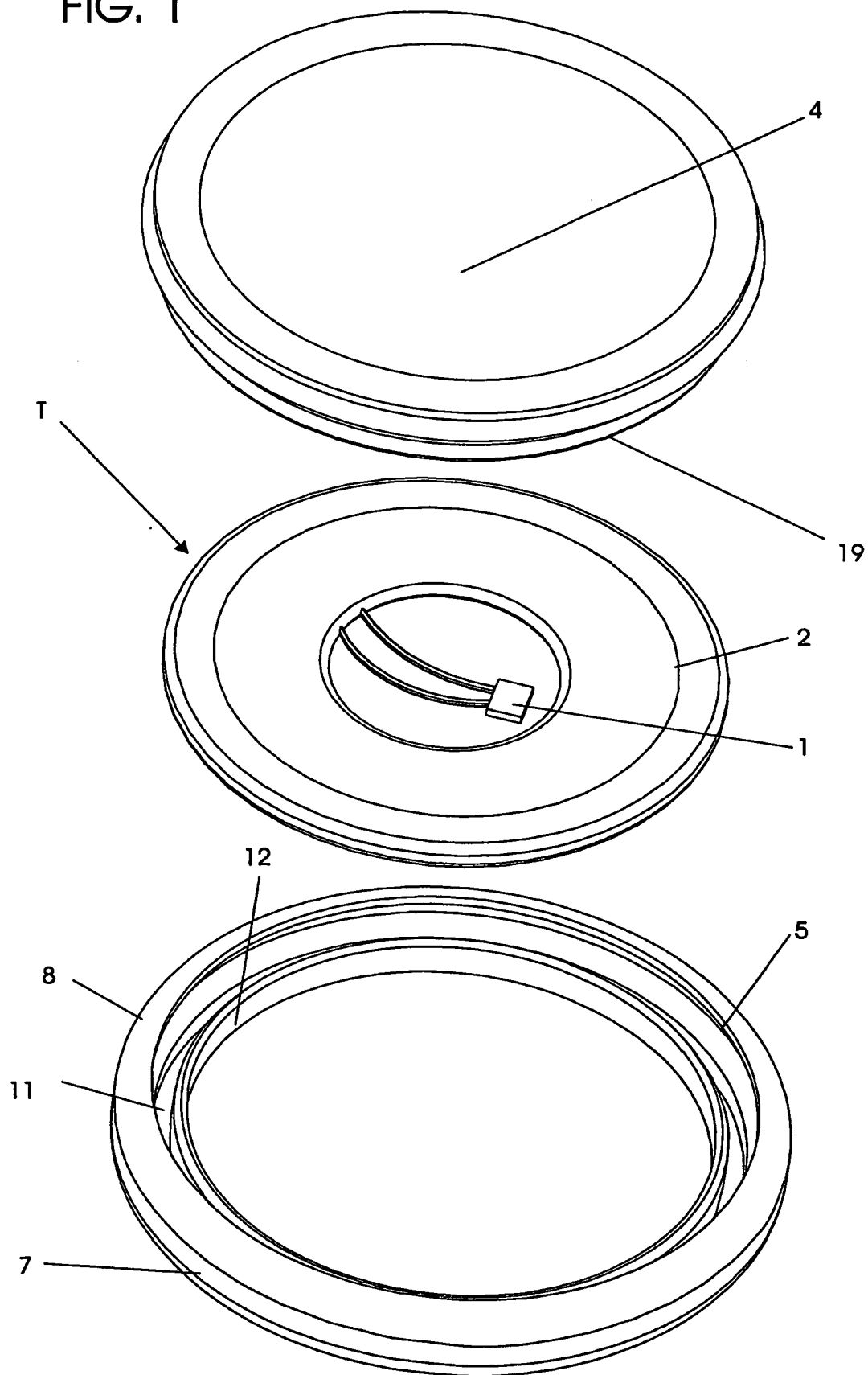


FIG. 2

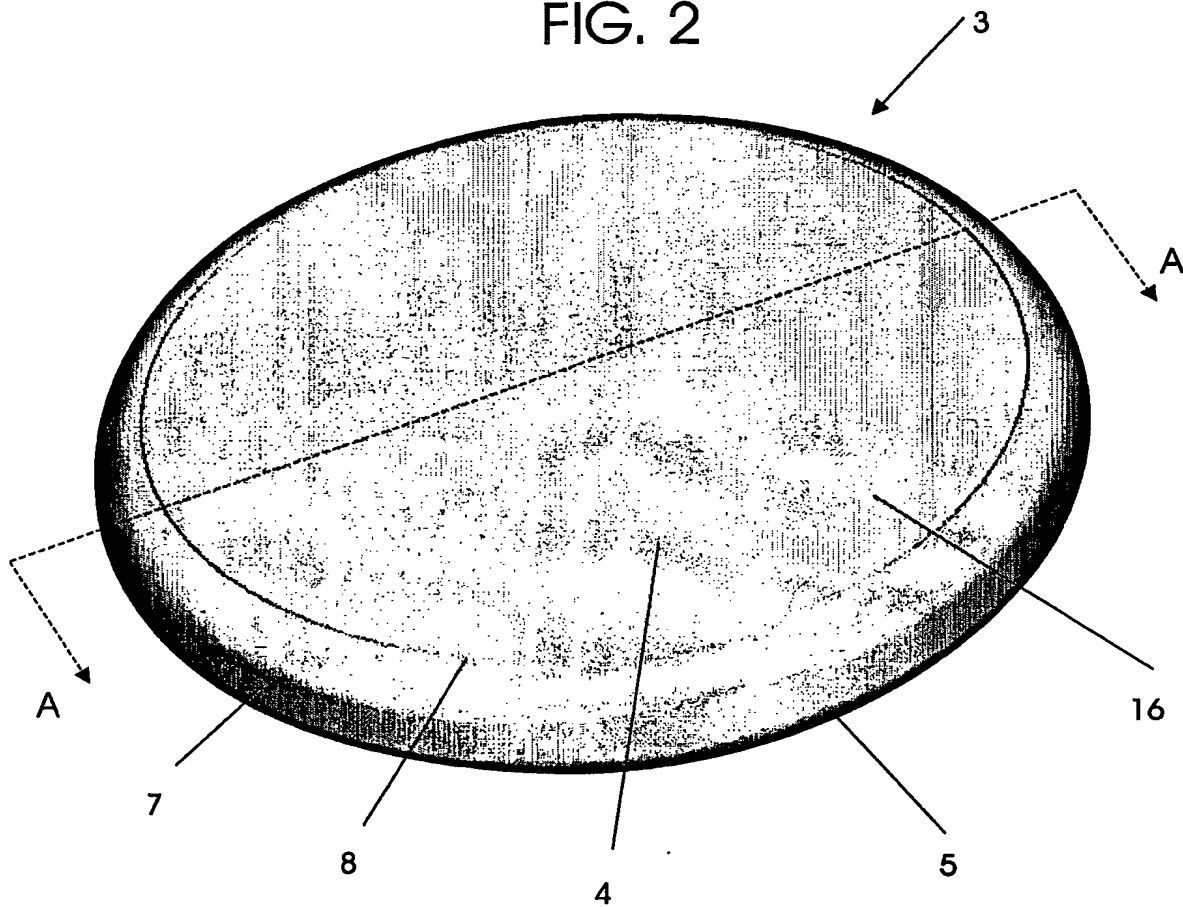
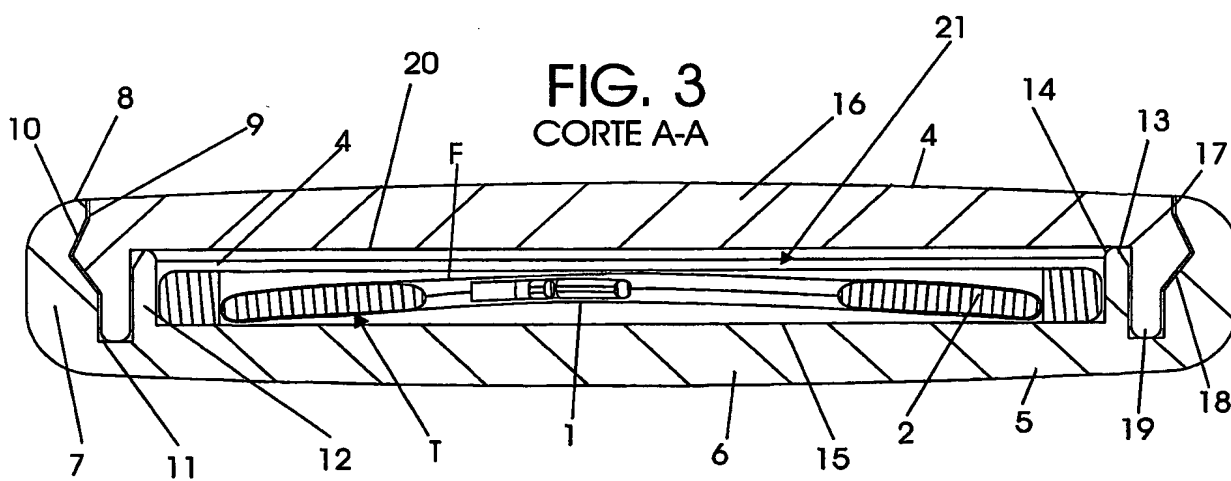


FIG. 3
CORTE A-A



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(71) Applicant (for all designated States except US): **TECH-
INVEST LTDA.** [BR/BR]; R Américo Brasiliense, 2444 -
1° andar, 04715-005 São Paulo - SP (BR).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **DE MACEDO, Mil-
ton, Flávio** [BR/BR]; R Marechal Badaglio, 15 - Ap 35,
09620-020 São Bernardo do Campo - SP (BR).

(74) Agent: **MOREIRA, Aguinaldo**; R Bela Cintra, 299 - 3rd
Floor, 01405-900 São Paulo - SP (BR).

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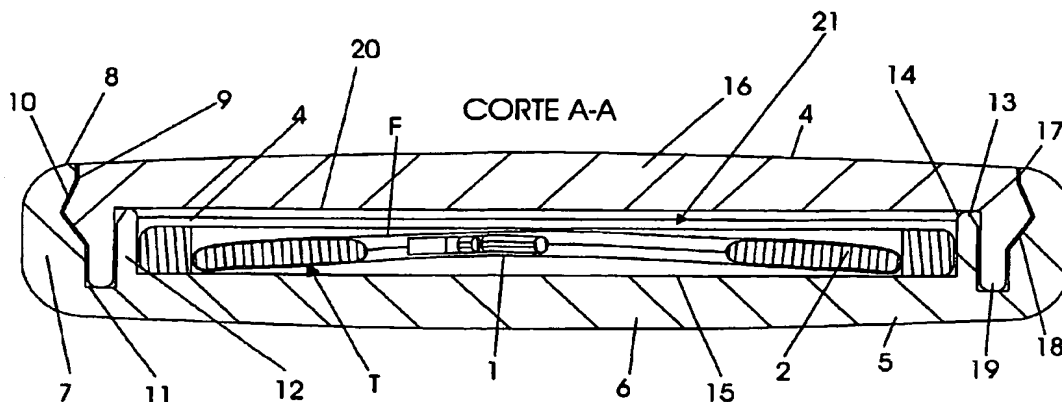
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GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted
a patent (Rule 4.17(ii)) for the following designations AE,
AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ,
CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE,
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PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ,
TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM,
ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA,
SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ,
BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE,

[Continued on next page]

(54) Title: **HIDDEN RECEIVER-SENDER DEVICE FOR PNEUMATICS TIRES**



(57) Abstract: A hidden receiver-sender device, wherein a transponder (T) is able to send and receive radio frequency signals with no losses, even in the presence of materials which may be potentially damaging to the transponder, the transponder being composed of a chip (1) and a coil (2). The transponder is doubly protected: first, by covering the transponder components with a plastic film (F); second, by placing the covered transponder inside a capsule (3) made of material transparent to electromagnetic waves and suitable for resisting against different material stresses, such as twisting, flexion, traction or mechanical vibrations, the capsule material preferably being a plastic which is not only transparent to electromagnetic waves but also is relatively flexible.



BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designation US
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 340/572.8,445-448; 235/492; 342/51; 361/752,724

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| A | US 6,147,659 A (TAKAHASHI et al) 14 November 2000, see entire document | 1-6 |
| A | US 6,067,016 A (DESCHENES et al) 23 May 2000, see entire document | 1-6 |
| A | US 6,097,293 A (GALLOWAY et al) 01 August 2000, see entire document | 1-6 |
| A | US 5,731,957 A (BRENNAN) 24 March 1998, see entire document | 1-6 |
| A | US 5,920,290 A (McDONOUGH et al) 06 July 1999, see entire document | 1-6 |



Further documents are listed in the continuation of Box C.



See patent family annex.

| | |
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Date of the actual completion of the international search

09 April 2005 (09.04.2005)

Date of mailing of the international search report

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Name and mailing address of the ISA/US

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Authorized officer

Thomas J. Mullen, Jr.

Telephone No. 571-272-2600

INTERNATIONAL SEARCH REPORT

International application No.

PCT/BR04/00094

Continuation of Item 4 of the first sheet:

The title is objected to under PCT Rule 4.3 as being longer than 7 words. A suggested title is:

HIDDEN RECEIVER-SENDER DEVICE FOR PNEUMATIC TIRES

Continuation of B. FIELDS SEARCHED Item 3:

EAST (protect, prevent, cushion, insulate, resistant, bend, deform, force, stress, impact, crush, destroy, moisture, corrosion, twist, strain, vibration, heat, temperature, overheat, overtemperature, tag, transponder, marker, electronic electromagnetic, wireless, inductive, acoustic, rf radio, rfid)